

**UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF WISCONSIN**

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**METSO MINERALS INDUSTRIES, INC.  
and METSO MINERALS (FRANCE) S.A.,  
Plaintiffs,**

**v.**

**Case No. 10-C-0951**

**JOHNSON CRUSHERS INTERNATIONAL, INC.  
and ASTEC INDUSTRIES, INC.,  
Defendants.**

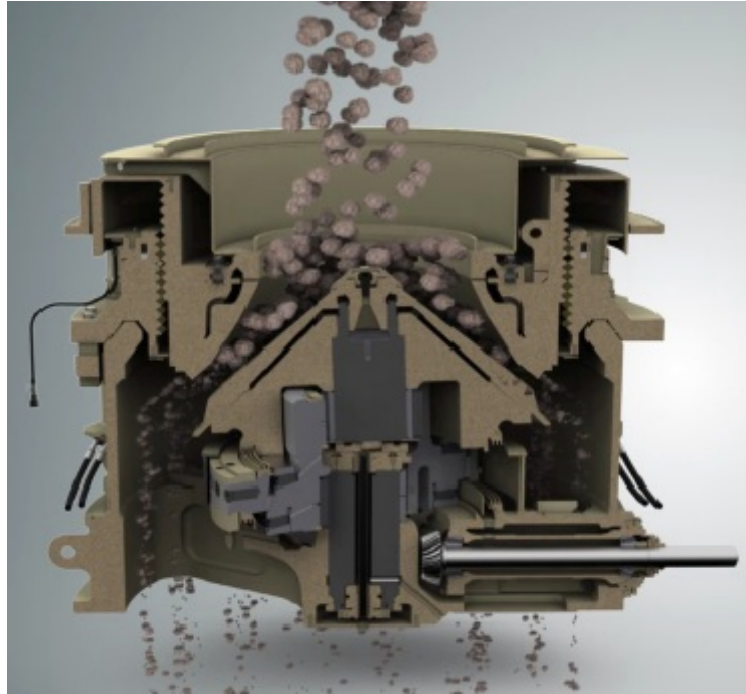
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**DECISION AND ORDER**

Johnson Crushers International, Inc., and Astec Industries, Inc. (together, “JCI”), claim that Metso Minerals Industries, Inc. and Metso Minerals (France) S.A. (together “Metso”) have infringed claims 8, 9 and 10 of U.S. Patent No. 6,032,886 (the “’886 patent”). Before me now are the parties’ motions for summary judgment.

**I. BACKGROUND**

The ’886 patent claims improvements to cone-type rock crushers, also known as conical crushers or cone crushers. These are machines that crush large rocks into smaller rocks for use in construction projects and other applications. In a typical crushing operation, large rocks are dumped into the top of the crusher. The rocks drop into an area of the crusher that is between a gyrating cone and an inverted cone-shaped bowl. The bowl encircles the cone, providing a surface against which the cone traps the incoming rock and crushes it. The smaller rocks then drop out of the bottom of the crusher. The image below, which depicts a cross section of a cone crusher, illustrates this general process:

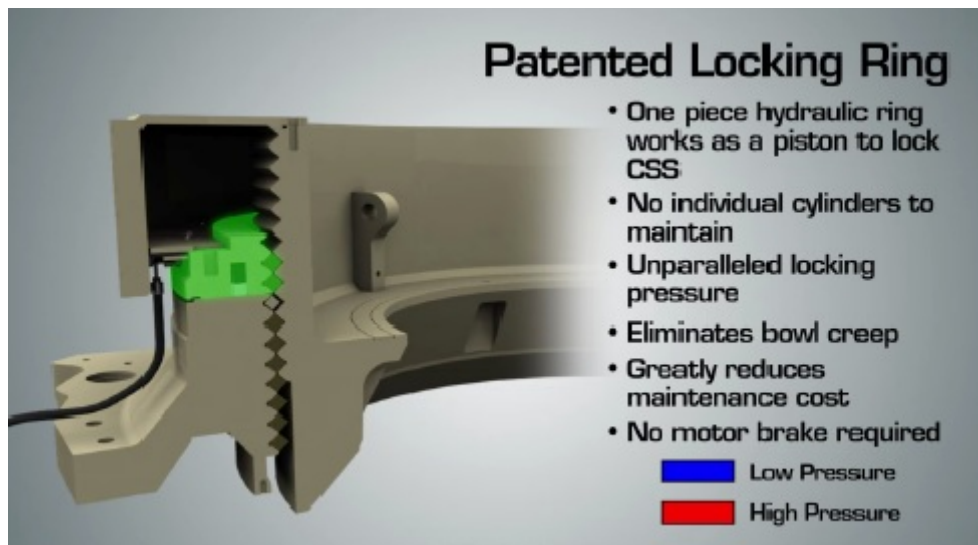


Because the operator of a cone crusher will want to make small rocks of different sizes, it is important to be able to adjust the spacing between the bowl and the cone—the smaller the space between the bowl and the cone, the smaller the resulting rock. In a typical cone crusher, adjustability is achieved by mounting the bowl in a threaded engagement on a bowl support, which is part of the frame of the crusher. The bowl can be screwed down on the threads to move the bowl closer to the cone, and it can be unscrewed to move the bowl up and away from the cone. The spacing between the bowl and the cone is known as the “closed side setting” or “CSS.” It is the CSS that determines the size of the rock produced by the crusher.

Although an operator will want to be able to move the bowl closer to or farther away from the cone between crushing operations, during a crushing operation the operator will want the bowl to remain stationary. This is so because if the bowl moves up or down during the operation, the size of the resulting rock will be inconsistent. Thus, the crusher

must be equipped with a mechanism that “locks” the bowl in place during crushing operations. When the operation is over, the operator must be able to release the lock so that he or she can move the bowl as needed for the next operation.

Claims 8, 9 and 10 of the '886 patent relate to a mechanism that performs the locking function on a cone crusher. JCI's “Kodiak” and “Kodiak Plus” crushers embody this mechanism. In this embodiment, a component known as a lock ring sits atop of the bowl support and encircles the bowl, as depicted in the cross-sectional image below (the lock ring is colored green):

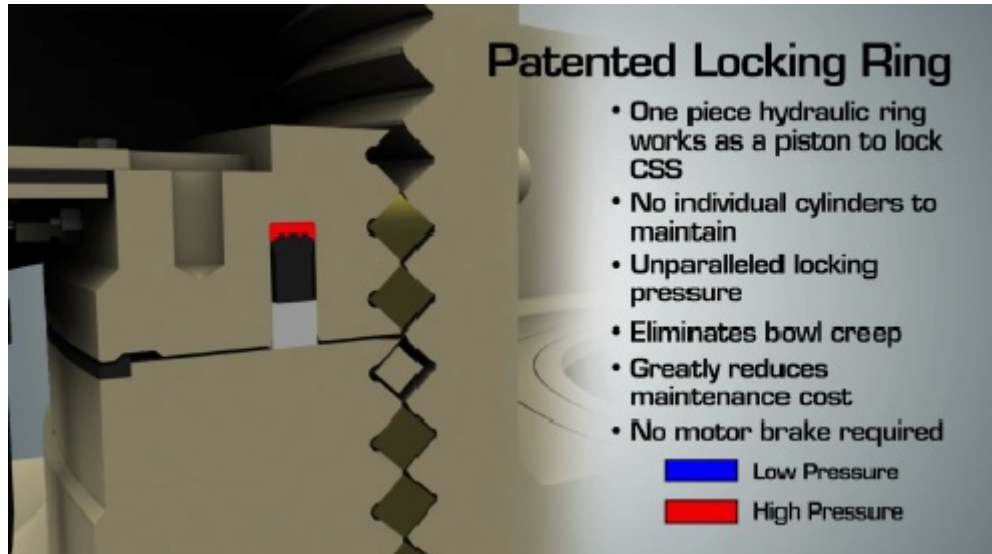


Like the surface of the bowl support, the surface of the lock ring has threads that match the threads on the outside surface of the bowl.<sup>1</sup>

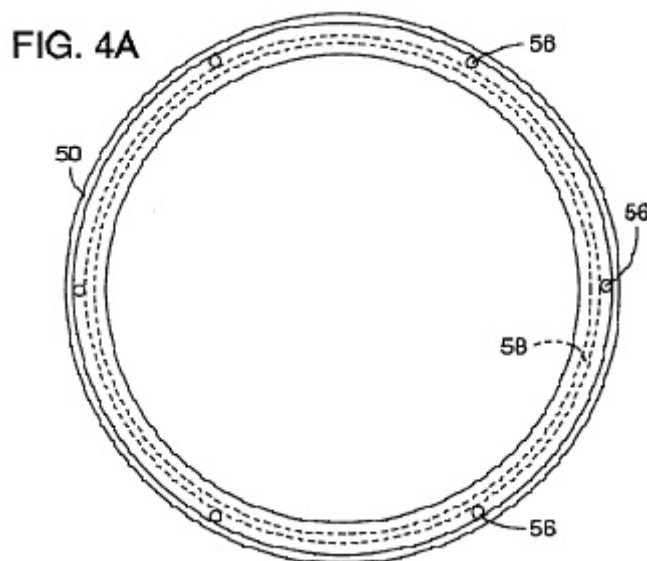
At the bottom of the lock ring is a groove or chamber, which can be seen in the close-up image below:

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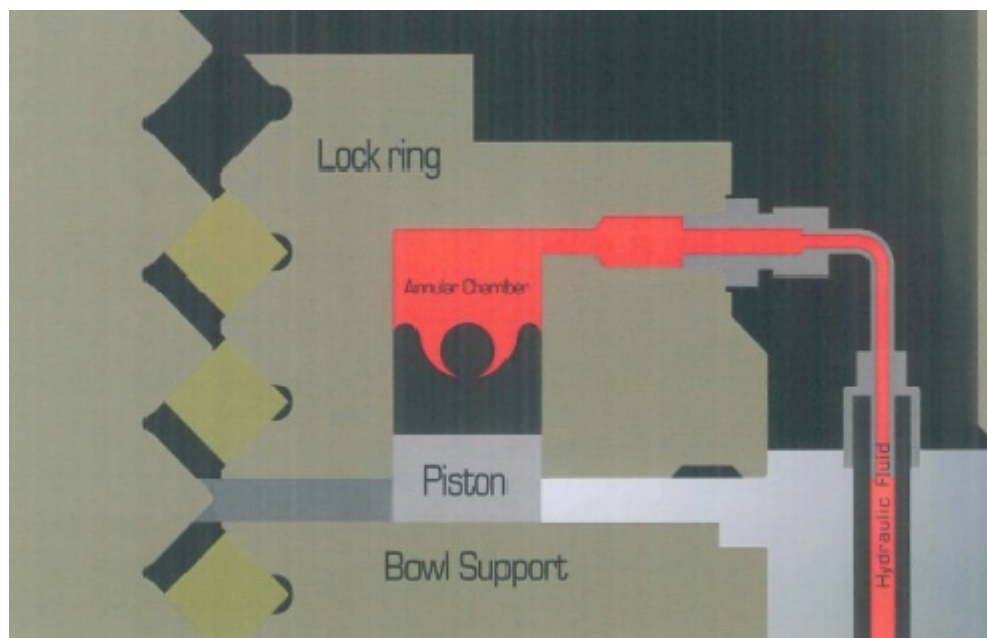
<sup>1</sup>In the image, there are diamond shapes between the threads. These are inserts designed to prevent galling or deformation of the threads. The inserts are the subject of claims in the '886 patent which are not at issue in the present case.



The groove or chamber contains a piston (shown in gray) and a seal (shown in black). Because the image depicts a cross section of the crusher, the groove or chamber appears as a rectangle. However, when the lock ring is viewed from below, it is apparent that the groove or chamber is ring-shaped, or “annular,” to use the term of art. The piston and the seal are also annular. The groove or chamber is represented by the dotted lines (58) in the image below, which is a view of the lock ring from above:



To lock the bowl in place, hydraulic fluid (shown in red in the images) is pumped into the upper part of the chamber or groove, and hydraulic pressure causes the seal to expand and forces the piston downward against the rim of the bowl support. This produces a force that drives the lock ring upward. The threads of the lock ring thus push up against the inserts which, in turn, push up against the threads of the bowl. This creates friction that binds the threads and prevents the bowl from moving during operation. The cross-sectional image below depicts the lock ring in the “locked” position:



JCI contends that certain of Metso’s cone crushers contain lock rings that infringe claims 8, 9 and 10 of the ’886 patent. In general, Metso’s lock ring is very similar to JCI’s. Like JCI’s lock ring, Metso’s lock ring contains an annular groove and uses hydraulic pressure to create a binding lock that jams the threads and prevents the bowl from moving during operation. The main difference between Metso’s lock ring and JCI’s lock ring is that the annular chamber in Metso’s lock ring contains a “bladder” made from elastomeric (i.e.,

rubber-like) material instead of a seal. In Metso's lock ring, hydraulic fluid is pumped into this bladder, which causes the bladder to expand or inflate. As the bladder expands, it pushes against an annular piston. These forces drive the lock ring upward and cause the threads to jam.

## II. CLAIM LANGUAGE AND CONSTRUCTION

Claims 8, 9 and 10 of the '886 patent are reproduced below. The parts of the claims that had to be construed during earlier proceedings in this case are underlined.

**8. A rock crusher comprising:**

a conical shaped bowl, a cone mounted for oscillating movement within the conical shaped bowl, said bowl being vertically adjustable relative to the cone for crushing rock to specific sizes;

a frame including an annular bowl support, said bowl adjustably supported within said annular bowl support for vertical adjustment of the bowl relative to the cone;

said vertical adjustment provided by mated screw threads on said support and said bowl whereby the bowl is screwed up or down on the support and thereby closer or farther away from said bowl;

an annular lock ring having a screw thread mated to the bowl and screwed onto the bowl and defining an annular surface in abutment with an annular surface of the support;

an annular chamber provided in one of the lock ring and bowl support and an annular piston fitted to the chamber, said piston providing the abutment surface for one of said lock ring and bowl support; and

a hydraulic fluid source providing hydraulic fluid to the chamber, and a control for controlling the hydraulic fluid flow to the chamber for urging movement of the annular piston toward the surface of the other of the lock ring and support and thereby producing a binding-type lock that inhibits screw movement of the bowl.

**9. A rock crusher as defined in claim 8 wherein the piston is provided with a seal portion between the piston and hydraulic fluid and expands under**

pressure to seal the chamber and induces movement of the piston against the other of the lock ring and bowl support.

**10.** A rock crusher as defined in claim 9 wherein the annular chamber is provided in the lock ring.

Substituting the results of claim construction into the claims results in the following:

**8.** A rock crusher comprising:

a conical shaped bowl, a cone mounted for oscillating movement within the conical shaped bowl, said bowl being vertically adjustable relative to the cone for crushing rock to specific sizes;

a frame including an annular bowl support, said bowl adjustably supported within said annular bowl support for vertical adjustment of the bowl relative to the cone;

said vertical adjustment provided by mated screw threads on said support and said bowl whereby the bowl is screwed up or down on the support and thereby closer or farther away from said cone;

an annular lock ring having a screw thread mated to the bowl and screwed onto the bowl and defining an annular surface of the lock ring in abutment with an annular surface of the support;

an annular chamber provided in one of the lock ring and bowl support and a ring-shaped component that fits snugly into the chamber and moves relative to the chamber in response to fluid pressure on one side, providing the abutment surface for one of said lock ring and bowl support; and

a hydraulic fluid source providing hydraulic fluid to the chamber so that a change in pressure in the chamber will influence the ring-shaped component to move with respect to the chamber, and a control for controlling the hydraulic fluid flow to the chamber for causing movement of the ring-shaped component that moves relative to the chamber in response to fluid pressure on one side toward the surface of the one of the lock ring and bowl support that does not include the ring-shaped chamber and thereby producing a binding-type lock that inhibits screw movement of the bowl.

**9.** A rock crusher as defined in claim 8 wherein the ring-shaped component that moves relative to the chamber in response to fluid pressure



on one side is provided with a seal portion between the ring-shaped component that moves relative to the chamber in response to fluid pressure on one side and the hydraulic fluid and wherein the seal portion expands under pressure to seal the chamber and causes movement of the ring-shaped component that moves relative to the chamber in response to fluid pressure on one side against the one of the lock ring and bowl support that does not include the ring-shaped chamber.

**10.** A rock crusher as defined in claim 9 wherein the annular chamber is provided in the lock ring.

### **III. DISCUSSION**

In its motion for summary judgment, Metso argues that claims 8, 9 and 10 of the '886 patent are invalid because either the prior art anticipates the inventions described in the claims or any differences between the claims and the prior art are such that the inventions would have been obvious to a person having ordinary skill in the art. A claim in a patent is presumed to be valid, and a party challenging this presumption of validity must prove that the claim is invalid by clear and convincing evidence. See 35 U.S.C. § 282(a); Microsoft Corp. v. i4i Ltd. P'ship, 131 S. Ct. 2238, 2242 (2011).

#### **A. Anticipation**

In patent parlance, "anticipation" means lack of novelty. Roughly speaking, if an invention already exists or is known at the time a patent is sought, the invention is not novel and cannot be patented. If the Patent and Trademark Office ("PTO") mistakenly issues a patent for an invention that is not novel, the patent is invalid. This rule appears in 35 U.S.C. § 102, which states in pertinent part as follows:

A person shall be entitled to a patent unless—

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or



(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States . . . .

In the present case, Metso argues that the inventions described in claims 8, 9 and 10 of the '886 patent were “described in a printed publication in this or a foreign country” and were “on sale in this country” more than one year prior to the date of the application for the '886 patent. To show that a claimed invention was described in a printed publication more than one year prior to the date of the patent application, Metso must point to a single prior art reference that discloses each and every element of the claimed invention. See Minn. Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559, 1565 (Fed. Cir. 1992). To show that a claimed invention was on sale in this country more than one year prior to the date of the patent application, Metso must prove that a single device on sale in this country at the relevant time included each and every element of the claimed invention—i.e., that the patent claim “reads on” such a device. Id. Moreover, Metso must show that the device described in the printed publication or embodied in the device sold is literally identical to the claimed invention, not just functionally equivalent to the claimed invention. See, e.g., Old Reliable Wholesale, Inc. v. Cornell Corp., 635 F.3d 539, 544–45 (Fed. Cir. 2011).

The application that matured into the '886 patent was filed with the PTO on March 18, 1999. Thus, the “critical date” of the '886 patent is March 18, 1998. Metso contends that one of its own cone crushers was on sale in the United States prior to that date, and that this crusher embodied the inventions of claims 8, 9 and 10 of the '886 patent. Metso introduced this crusher, the HP100, in 1996. Metso made changes to the design of the HP100 in late 2000 and again in 2007, and hence I will refer to the HP100 as it existed

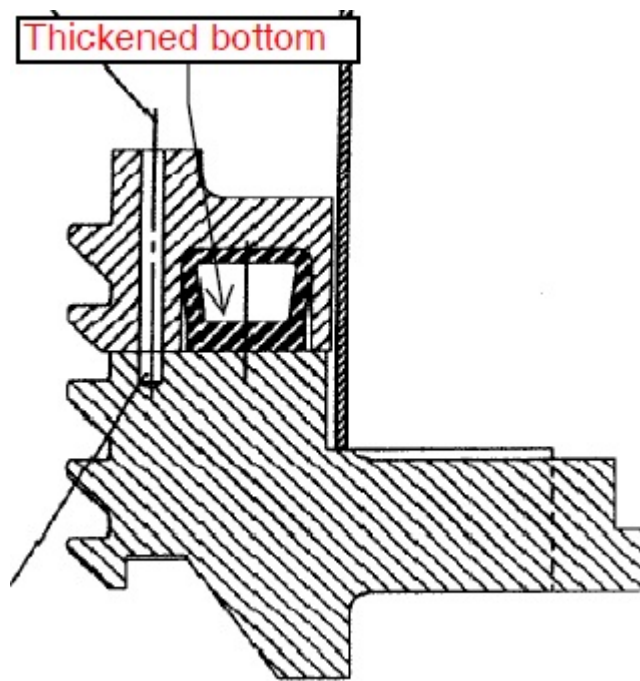
between 1996 and 2000 as the “original” HP100. JCI contends that the changes made in late 2000 and preserved in 2007 resulted in a design that infringes claims 8, 9 and 10 of the ’886 patent. However, JCI contends that the original HP100 does not infringe those claims. Metso, however, contends that the claims as construed read on the original HP100, and that therefore the original HP100, which JCI concedes was sold in the United States prior to March 18, 1998, anticipates and invalidates those claims. Metso also contends that the instruction manual for the original HP100 constitutes a printed publication that discloses each and every element of claims 8, 9 and 10.<sup>2</sup>

The parties agree that the original HP100 meets the elements stated in the first four subparagraphs of claim 8: a cone and a vertically adjustable bowl mounted in a threaded engagement, with the bowl held in place during operation of the crusher by a lock ring. See Joint Statement of Undisputed Facts (“JSF”) ¶ 44. The parties also agree that the original HP100 uses hydraulic fluid to produce the force that binds the threads, id. ¶ 47, and that the hydraulic fluid is pumped into a ring-shaped groove or chamber in either the lock ring or the bowl support, id. ¶ 50. However, unlike JCI’s embodiment of claims 8, 9 and 10, the original HP100 pumps hydraulic fluid into a bladder located in the groove or chamber, rather than directly into the groove or chamber. Still, this difference does not prevent anticipation, because as I have construed the claims, they read on a device that pumps hydraulic fluid into a bladder located in the groove or chamber. See Nov. 28, 2011 Order at 17–19, ECF No. 49. Indeed, the post-2000 and post-2007 versions of the HP100 also rely on bladders, as do the other accused devices.

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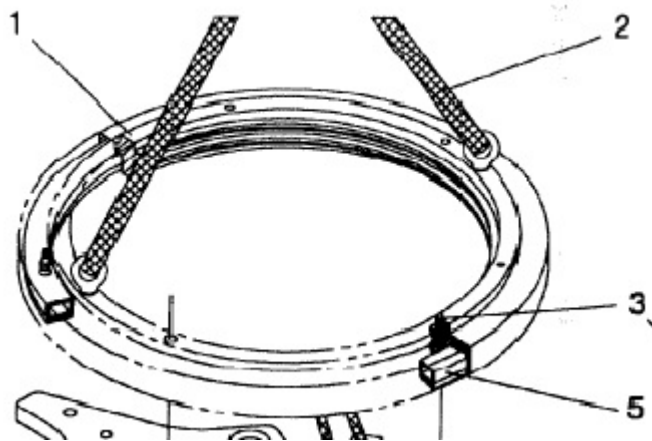
<sup>2</sup>No information regarding the original HP100 was before the PTO when it issued the ’886 patent.

As JCI sees things, the key difference between the original HP100 and claims 8, 9 and 10 (and later versions of the HP100 and the other accused devices) is that the original HP100 does not meet the claim element “piston.” In the HP100, the bladder itself has a thickened, flat bottom that pushes against the bowl support when the bladder fills with hydraulic fluid, as illustrated by the arrow in the image below.



Metso refers to the thickened bottom as a “shim,” and it describes the bladder of the HP100 as having an “integrated shim.” In later versions of the HP100, Metso separated the bladder and shim into two different parts. In these later versions, the bladder still fills with hydraulic fluid, but the bottom of the bladder pushes against a separate part, and it is that part (the shim) that pushes against the bowl support. JCI contends that claims 8, 9 and 10 of the ’886 patent read on the versions of the HP100 with a separate shim but not on the version of the HP100 with an integrated shim. Essentially, JCI contends that the shim is a “piston” only when it is separate from the bladder.

I conclude that claim 8 reads on the original HP100. Claim 8 requires “an annular piston fitted to the chamber, said piston providing the abutment surface for” either the lock ring or the bowl support. Moreover, I accepted JCI’s claim-construction argument and construed the claim language “an annular piston fitted to the chamber” to mean “a ring-shaped component that fits snugly into the chamber and moves relative to the chamber in response to fluid pressure on one side.” See Nov. 28, 2011 Order at 17, ECF No. 49. Thus, as construed, claim 8 requires a ring-shaped component that fits snugly into the chamber and that moves relative to the chamber in response to fluid pressure on one side, and that the ring-shaped component provide the abutment surface for either the lock ring or the bowl support. The HP100’s integrated shim fits that description. It is a “ring-shaped component,” in that the shim part of the bladder (like the bladder itself) is ring-shaped when viewed from above, as shown in the image below (the integrated bladder and shim is designated by the number 5):



The shim also “fits snugly in the chamber,” in that there is very little space between the shim and the sides of the chamber, as illustrated in the cross-sectional image with the arrow pointing to the thickened bottom, above. The shim also “moves relative to the

chamber in response to fluid pressure on one side,” in that when hydraulic fluid is pumped into the chamber, it puts pressure on the top side of the shim, and then the resulting forces push the chamber upwards and the shim downwards into the bowl support. Finally, the shim provides the necessary abutment surface. Nothing in the claim language or in my construction of the claim language requires that the piston be physically separate from the surrounding parts of the crusher, and so the fact that the shim and the bladder are “integrated” is inconsequential. Therefore, the original HP100 anticipates and invalidates claim 8.<sup>3</sup>

Claims 9 and 10 are different, however. Claim 9 adds the requirement that a “seal portion” be placed “between the piston and hydraulic fluid,” and claim 10 incorporates that requirement. The bladder of the original HP100 could be described as a “seal portion,” but because the bladder and the shim are integrated, with the shim forming the bottom of the bladder, the bladder is not between the shim (piston) and the hydraulic fluid: when hydraulic fluid enters the chamber, it also enters the bladder and comes into direct contact with the top of the shim. Thus, the original HP100 does not literally contain all the elements of claims 9 and 10. Likewise, its instruction manual does not literally disclose all the elements of claims 9 and 10. Therefore, neither the original HP100 nor its instruction manual anticipates claims 9 and 10.

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<sup>3</sup>Because the sale of the original HP100 invalidates claim 8, I do not need to separately consider whether the original HP100's instruction manual constitutes an invalidating “printed publication.”

## **B. Obviousness**

A patent cannot be issued when “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” 35 U.S.C. § 103(a). A principal reason for refusing to allow patents on what is obvious is that it is tantamount to withdrawing from public use and into monopoly methods and techniques that were previously available and known to persons having ordinary skill in the art. See KSR Int’l Co. v. Teleflex, Inc., 550 U.S. 398, 415–16 (2007). Thus, obviousness is similar to anticipation, with one difference being that anticipation will invalidate a patent only when the patent claims an invention that is identical to what is already present in the prior art, while obviousness will invalidate a patent when no such identical device is present in the prior art but the invention is nothing but an obvious modification of the prior art. Cf. Lewmar Marine, Inc. v. Barient, Inc., 827 F.2d 744, 747–48 (Fed. Cir. 1987).

The Supreme Court has instructed the lower courts to use an “expansive and flexible approach” to the question of obviousness, and thus there is no rigid test for determining whether a patent claims what would have been obvious to a person having ordinary skill in the art at the relevant time. KSR, 550 U.S. at 415. Instead, a court must consider the items described in Graham v. John Deere Co., 383 U.S. 1 (1966): (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) the so-called “secondary considerations” or “objective considerations.” See KSR, 550 U.S. at 406. These secondary or objective considerations include “commercial success,” “long felt but

unsolved needs,” “failure of others,” and various other considerations. See Graham, 383 at 17–18.

I have already determined that claim 8 is invalid because the original HP100 anticipates it. Moreover, the only difference between claims 9 and 10 and the original HP100 is that the “seal portion” of the HP100—i.e., the bladder<sup>4</sup>—is not “between” the piston and the hydraulic fluid. Thus, to determine whether claims 9 and 10 are invalid for obviousness, the only question is whether requiring the seal portion to be “between” the piston and the hydraulic fluid would have been obvious to a person having ordinary skill in the art at the time of JCI’s invention. Put differently, the only question is whether separating the seal and piston into two unattached parts would have been obvious to a person having ordinary skill in the art. To ask that question is almost to answer it: it is generally obvious to separate a single component into two components that together perform the same function as the single component. See Reed Propeller Co., Inc. v. United States, 42 F. Supp. 545, 568 (Ct. Cl. 1942). Nonetheless, in the discussion below, I demonstrate that the inventions of claims 9 and 10 would have been obvious to a person having ordinary skill in the art at the relevant time.<sup>5</sup>

At the time of JCI’s invention, one well known means for locking the bowl in place during operation of a cone crusher was to use a series of separate hydraulic clamping

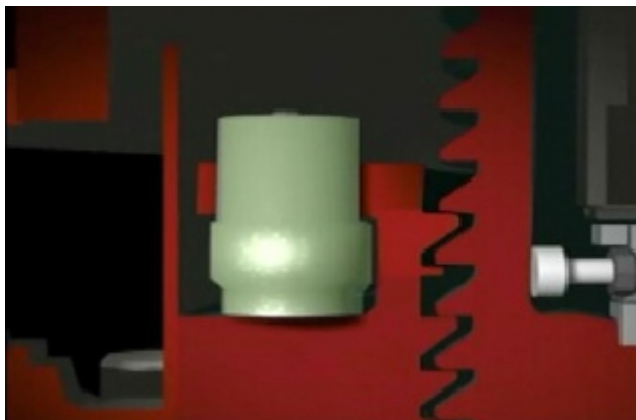
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<sup>4</sup>JCI concedes that a bladder satisfies the claim element “seal portion,” either literally or under the doctrine of equivalents. See JCI Br. at 24–26, ECF No. 113; JCI Reply Br. at 9–10, ECF No. 9–10.

<sup>5</sup>In the discussion below, I do not discuss the level of ordinary skill in the art, as the parties appear to be in agreement on that issue. They define a person having ordinary skill in the art as one with significant experience in designing, manufacturing, or operating cone crushers. See Metso Proposed Findings of Fact (“MPFF”) ¶ 158.



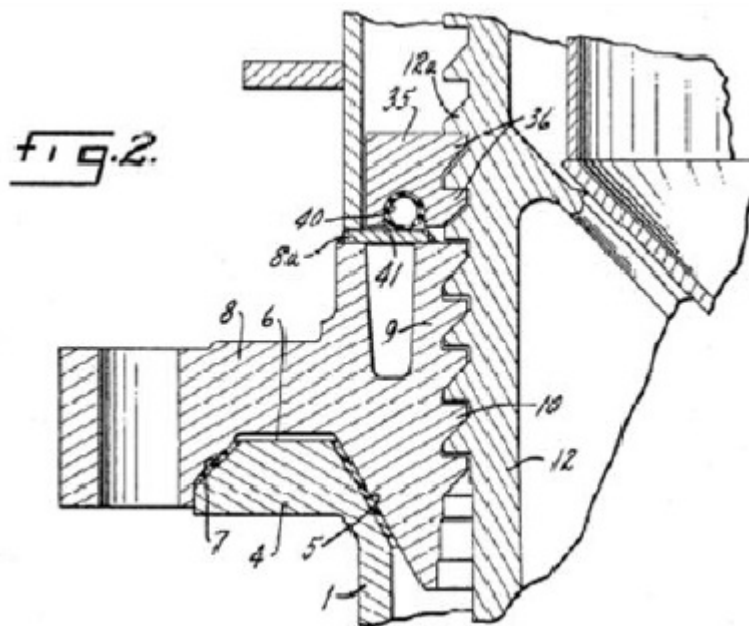
cylinders to produce the binding force that jams the threads. Here is an illustration of a single clamping cylinder:



A cone crusher that uses these cylinders will have a series of them evenly distributed around the circumference of the lock ring. To lock the bowl in place, hydraulic fluid is provided to all cylinders at the same time, and this causes the lock ring to raise and jam the threads.

According to JCI, at the time it began to think about how to improve its lock ring—which was in early 1998—the state of the cylinder art was such that a series of cylinders could not produce enough jamming force to hold a bowl in place on a “high-powered” or “souped up” crusher. This inadequacy resulted in high-powered crushers that did not reliably maintain the CSS and that produced inconsistent-sized rock. JCI endeavored to address this inadequacy—it wanted to design a high-powered cone crusher that reliably maintained the CSS. At first, JCI considered increasing the number of separate cylinders placed around the circumference of the lock ring, but it rejected that idea because the number of cylinders needed to produce sufficient force would not fit around the periphery of the crusher, among other reasons.

Having rejected multiple separate cylinders, JCI turned to an alternative bowl-locking design that was disclosed in the prior art: using a single, annular hydraulic cylinder located inside the crusher to produce the clamping force. Unlike a system of multiple separate cylinders, a single annular cylinder can provide force evenly around the entire circumference of the bowl. Using a single, annular hydraulic cylinder to lock the bowl in place in a cone crusher during operation had been known in the art since the mid-1960s, when U.S. Patent No. 3,272,446 was issued to Hesse. However, the Hesse design employed a bladder, which is represented as 40 in the cross-sectional image below:

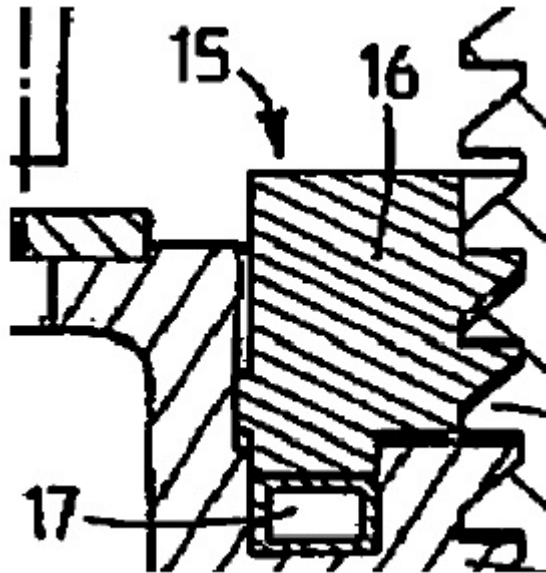


As in the HP100, the Hesse bladder is ring-shaped when viewed from above or below.<sup>6</sup> When the bladder is inflated with hydraulic fluid, it performs the same function as the individual clamping cylinders—it puts pressure on the lock ring (35) and causes the lock

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<sup>6</sup>The Hesse patent states that the bladder can be either a “circumferential” tube or a “group of tubes.” U.S. Patent No. 3,272,446, col. 2, ll.57–59.

ring to lift up, which jams the threads.<sup>7</sup> Another example of an annular hydraulic cylinder used to lock the bowl of a rock crusher can be found in French Patent No. 2,700,786, issued in 1993. The parties refer to this patent as the “Durand” patent or the “CFBK” patent. Like Hesse, Durand used an annular bladder, which is represented by 17 in the cross-sectional image below:



In this design, when the bladder fills with hydraulic fluid, it puts pressure on the portion of the lock ring that is extended down into the chamber with the bladder. This pressure causes the lock ring to lift up, which in turn jams the threads.<sup>8</sup>

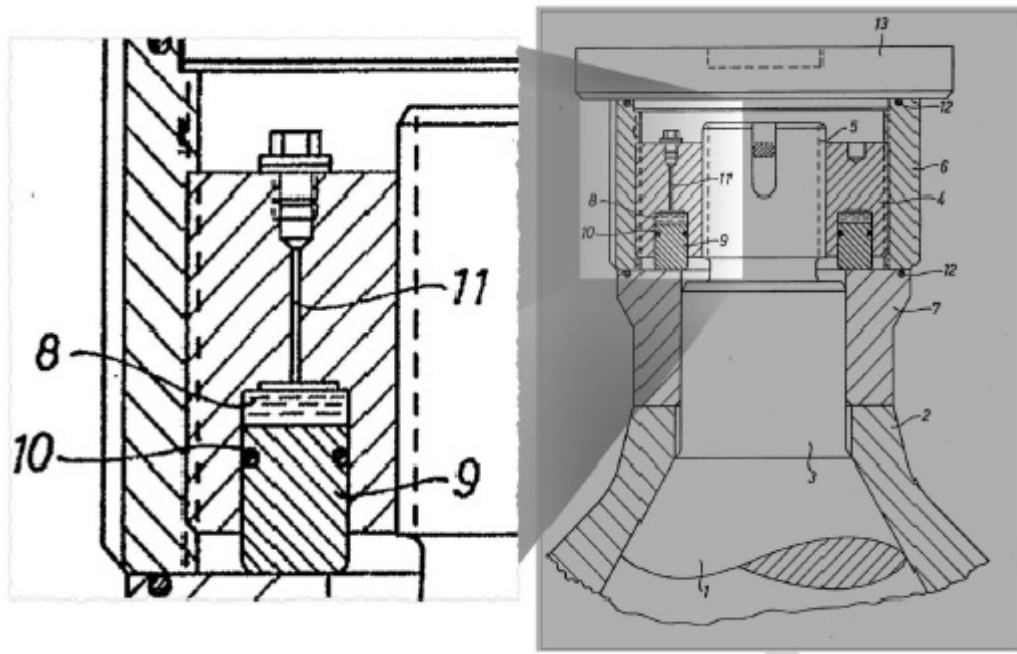
In designing its annular hydraulic cylinder, JCI did not use a bladder. As explained above, JCI’s embodiment of the invention uses a seal portion that is not a bladder, as well as a separate piston. Bladder-less annular hydraulic cylinders had been employed in the

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<sup>7</sup>The Hesse patent was not before the PTO when it issued the ’886 patent.

<sup>8</sup>The Durand patent was not before the PTO when it issued the ’886 patent.

art prior to the time JCI designed its prototype, although as far as the record reveals, they had not been used to perform the locking function on a cone crusher. German Patent No. 1,283,654, issued in 1968 to Meder, discloses a bladder-less, annular hydraulic cylinder used to lock a crushing cone in place:

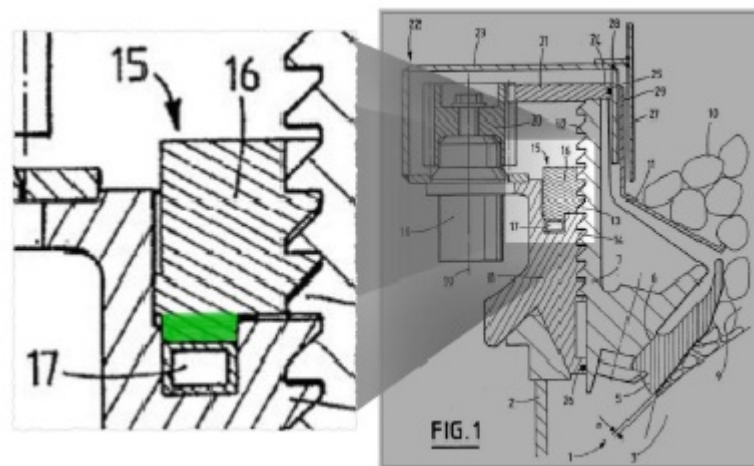


Meder's design includes an annular groove or chamber cut into the face of the threaded locknut (4), which is fitted with an annular piston (9) and sealing rings (10). Hydraulic fluid (8) enters the top of the chamber through a channel (11), which creates pressure in the chamber that moves the piston. However, the purpose of moving the piston is not to lock the bowl in place during operation of the crusher, but to "pre-tension" certain components of the crusher to make it easier to tighten the clamping nut (6) by hand or with a normal wrench.<sup>9</sup>

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<sup>9</sup>The Meder patent was not before the PTO when it issued the '886 patent.

Another concept that was known in the art at the time of JCI's invention was that if a bladder or another component made of elastomeric material is used in a hydraulic cylinder, some means of preventing that component from extruding or squeezing into spaces where it is not wanted once hydraulic pressure builds up in the cylinder has to be employed. See Metso Add'l Proposed Findings of Fact ¶ 212; May 23, 2012 Vendelin Dep. at 92–93; June 18, 2011 Heeszal Dep. at 123–24. For instance, in the Durand patent, a portion of the lock ring is depicted extending down into the chamber containing the bladder. In the illustration below, that portion is highlighted in green:



Without the extended portion, when the bladder is inflated and lifts the lock ring, parts of the bladder might extrude into the space between the lock ring and the bowl support, causing damage to the bladder. Similarly, in the original HP100, Metso used a bladder with a thickened bottom to prevent extrusion. In its prototype, JCI did not use a bladder, but the seal it used was made of a “very elastic piece of material” that posed an extrusion risk. June 18, 2011 Heeszal Dep. at 123. One of the purposes of JCI's piston, which was

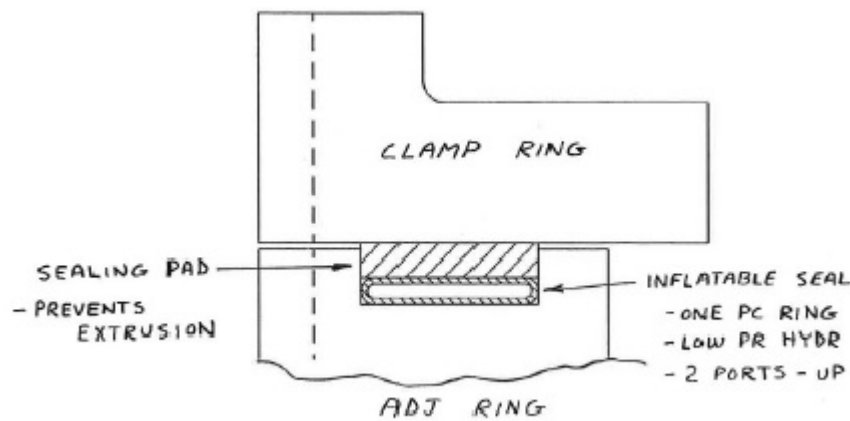
made of hard plastic, was to prevent the seal from extruding into the space between the lock ring and the bowl support. Id. at 123–24.

Thus, at the time JCI designed its prototype, a person having ordinary skill in the art would have known that one could use an annular hydraulic cylinder to lock the bowl of a cone crusher in place during operation. Such a person also would have known that one could construct an annular hydraulic cylinder in at least two different ways: with a bladder, or without a bladder. Finally, such a person would have known that if one used elastomeric material in a hydraulic cylinder, one needed to employ a means for preventing extrusion. In light of this common knowledge in the art, it is hard to see anything in JCI's invention that would not have been obvious to a person having ordinary skill in the art at the time. Perhaps the use of a bladder-less, annular hydraulic cylinder to lock the bowl in place during operation of the crusher would not have been obvious, but claims 9 and 10 of the '886 patent are not limited to rock crushers without bladders.

So far, I have discussed the obviousness of JCI's invention generally and have not focused on the sole difference between claims 9 and 10 and the original HP100: the separation of the integrated bladder and shim into two components. However, as explained below, the design history of the HP100 confirms that JCI's separate seal and piston was not an unobvious modification of the prior art.

According to Metso, the design process for the HP100 began in 1993, when engineers met in Waukesha, Wisconsin to brainstorm possible design changes to two of its existing crushers, the HP400 and the HP300, which at the time used a series of separate cylinders to lock the bowl in place. The engineers, who were familiar with the

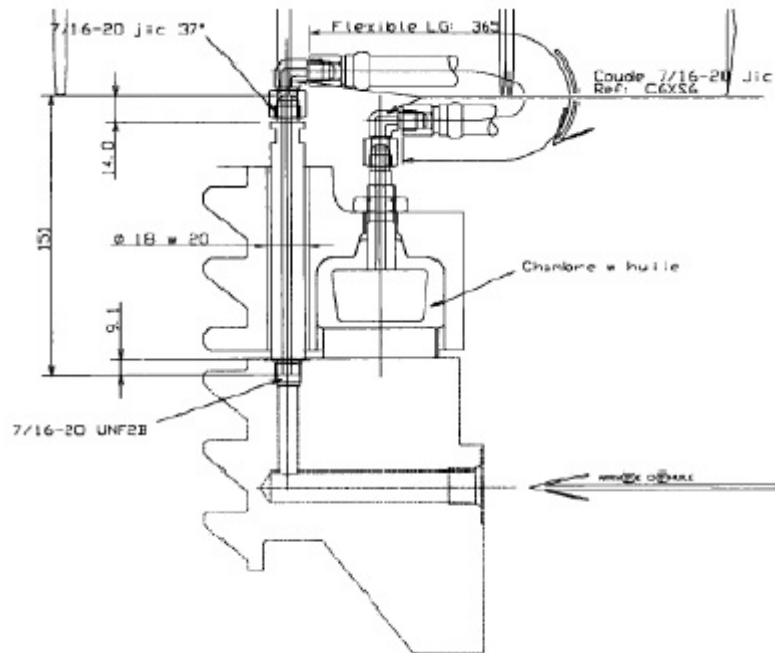
Hesse patent, considered changing from a series of separate cylinders to an annular hydraulic system that used a bladder. They created the following sketch:



In this sketch, the “adj [adjustment] ring” is what we have been referring to as the bowl support, and the “clamp ring” is what we have been referring to as the lock ring. As can be seen from the sketch, the bladder would have been located in a chamber in the bowl support, and a “sealing pad” would have been placed between the bladder and the lock ring to prevent extrusion. The sealing pad is clearly represented as a component separate from the bladder. Shortly after the Waukesha engineers created this sketch, Metso transferred design control for certain crushers to Metso’s engineering group in France. During the transition of design responsibility, the Waukesha engineers gave the notes and sketches regarding possible improvements to the HP crushers to the French engineers.

The French engineers were the engineers who designed the original HP100. They decided to use an annular ring with bladder technology to produce the forces that would hold the bowl in place during operation of the crusher. By 1995, the French engineers had completed a number of layout drawings for their design, including this cross-sectional image of the lock ring:

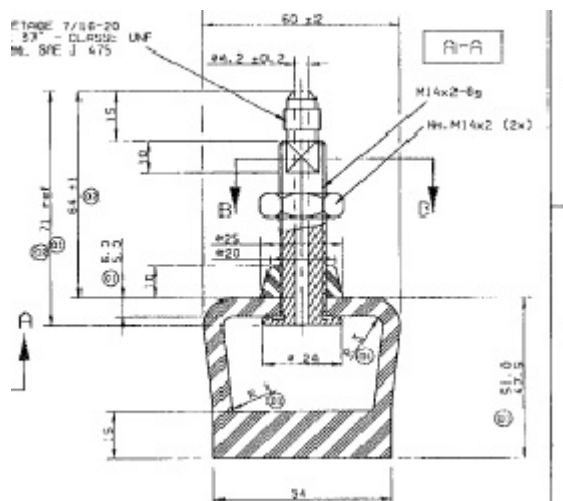




The bladder or oil chamber (“Chambre à huile”), which is located in the lock ring, is depicted as a component that is separate from the rectangular component below it. The purpose of the separate, rectangular component is to prevent the bladder from extruding into the space created when the bladder is pressurized and the lock ring lifts. This design is essentially the same as the Durand design from 1993, discussed above, except that the bladder is in the lock ring rather than the bowl support, and the anti-extrusion device is a separate part instead of an extended portion of the lock ring.

As Metso moved closer to completing the HP100, it worked with seal manufacturers and hydraulic component vendors, one of which suggested combining the bladder and the anti-extrusion device into one component. Metso adopted this suggestion and proceeded to design the integrated bladder and shim that Metso would use in the final version of the original HP100. As discussed, the shim portion of the integrated bladder and shim was the thickened bottom of the bladder. The shim was made thick enough so that it would not fit

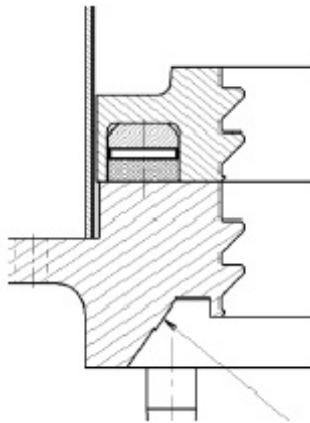
in the gap created between the lock ring and bowl support when the bladder inflated. A design drawing for the integrated bladder and shim appears below:



As noted, Metso introduced the original HP100, which contained the integrated bladder and shim, in 1996. By 1998, Metso had received reports from customers stating that the integrated bladder and shim leaked. However, the bladders did not all leak in the same spot—some leaks developed near the insertion of the valve stem into the bladder, some leaks occurred at the corners of the bladder, and still other leaks occurred at the seam in the bladder where the bladder manufacturer had sealed together the two ends of the bladder to create a circle. After investigating, Metso concluded that the manufacturer of the integrated bladder and shim was having trouble producing high-quality bladders on a consistent basis.

Because of the problems with the integrated bladder and shim, Metso decided to abandon it and revert back to a design using a separate bladder and shim, such as the one depicted in the French engineers' design drawing in 1995. The separate bladder and shim took up less space in the lock ring than the integrated bladder and shim, and so Metso had

to change the dimensions of the chamber in the lock ring when it changed to the separate bladder and shim. To allow the current owners of the HP100s to continue using the lock ring associated with the integrated bladder and shim design and to allow the inventory of unsold HP100s to remain saleable, Metso developed what it called the “retrofit” design. This design included a “spacer” placed in the top of the chamber to account for and fill the extra space that had been taken up by the larger integrated bladder and shim. The image below depicts the retrofit design and shows the spacer (top), the bladder (middle), and a rectangular shim (bottom):



Starting in 2000, new HP100s were sold with a smaller chamber containing a separate bladder and shim.

This history of the design of the HP100 underscores that, as of the mid-1990s, using a component that is separate from the bladder (or other elastomeric component) to prevent extrusion was an obvious design choice. When the Waukesha engineers first thought about using a bladder, they realized that a device would be needed to prevent extrusion, and their sketch reveals that they envisioned this device as a separate component. When the French engineers first designed the HP100's bladder in 1995, they too envisioned the anti-extrusion device as a separate component. It was only when a vendor suggested the

possibility of integrating the anti-extrusion component into the bladder that the French engineers changed their design. When the integrated bladder and shim proved to be problematic in practice, the French engineers reverted back to their original design involving a separate bladder and shim. Thus, if anything, it was the integrated bladder and shim that represented a possible unobvious modification of the prior art. When that design did not pan out, the engineers reverted back to what persons having ordinary skill in the art at the time would have considered the standard or default design, which was to separate the bladder and shim into two components. Thus, JCI's decision to put a "seal portion" between the hydraulic fluid and the "piston," as in claims 9 and 10, did not result in a unobvious modification of the prior art.<sup>10</sup>

Considering the "secondary" or "objective" considerations from Graham v. John Deere Co. does not alter this conclusion. JCI contends that six such considerations are relevant. First, JCI contends that the relevant claims of the '886 patent are not obvious because they satisfied a "long-felt but unsolved need" in the industry. See Graham, 383 U.S. at 17. JCI contends that at the time of its invention there was a need for higher-powered cone crushers that could reliably maintain the CSS and prevent bowl slippage. Perhaps that is true, but JCI has not shown that the extremely minor differences between claims 9 and 10 and the prior art resulted in a satisfaction of that need. See Geo. M.

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<sup>10</sup>JCI contends that the French engineers did not rely on their drawing from 1995 when producing the retrofit design. JCI also contends that the French engineers in 1995 did not rely on the Waukesha engineers' drawing from 1993 when producing their design for the separate bladder and shim. If these things are true, then that is only further proof that the separate bladder and shim is an obvious design choice: three groups of engineers independently designed a lock ring containing a separate bladder and shim without knowledge of the other groups' designs.

Martin Co. v. Allance Mach. Sys. Int'l LLC, 618 F.3d 1294, 1304 (Fed. Cir. 2010) (noting that where differences between prior art and claimed invention are minimal, such differences cannot be deemed to have satisfied any long-felt need). Indeed, it appears that to the extent JCI's Kodiak crushers satisfied any need for higher-powered crushers that reliably maintained the CSS, that was because JCI switched from the separate, multi-cylinder design to a design involving an annular hydraulic cylinder. See JCI Br. at 64 (stating that JCI's annular design provided five times more clamping pressure than multi-cylinder design). However, as discussed, using an annular hydraulic cylinder instead of a series of separate cylinders to lock the bowl on a cone crusher was well known in the art at the time of JCI's invention.

Second, JCI contends that the original HP100 constitutes an example of "failure of others." See Graham, 383 U.S. at 17. However, even if Metso's integrated bladder and shim can be deemed a failure because it had a tendency to leak, that does not imply that JCI's design was not obvious. As described above, Metso's decision to integrate the bladder and shim was a modification of its previous design choice, which was to use a separate bladder and shim. When the modification failed, Metso went back to the original design. Thus, Metso's attempt and failure does not imply that the original design was not obvious. Indeed, the fact that the Waukesha engineers, the French engineers, and JCI's engineers each designed an annular hydraulic cylinder using a separate seal portion and piston during the same approximate time period is strong evidence that using separate components was an obvious choice. See Stewart-Warner Corp. v. City of Pontiac, Mich., 767 F.2d 1563, 1570 (Fed. Cir. 1985).

Third, JCI contends that its lock ring yielded surprising or unexpected results. The caselaw states that an invention is less likely to have been obvious if a person having ordinary skill in the art would have been surprised by the invention's result. See, e.g., In re Soni, 54 F.3d 746, 750 (Fed. Cir. 1995). JCI points out that the inventors of its prototype, who were new to the rock-crushing industry as of 1998, see MPFF ¶ 66, were surprised to learn that their annular design worked better than a design that relied on a series of separate cylinders to lock the bowl. See Heeszel Decl. ¶¶ 16–17. However, JCI does not explain what a person having ordinary skill in the art at the time of its prototype would have expected when switching from a series of separate cylinders to a single, annular cylinder, and so the fact that JCI's inventors were surprised proves nothing. Moreover, JCI has made no attempt to show that the results that surprised its inventors were attributable to the only difference between claims 9 and 10 and the prior art—namely, the use of a “seal portion” between the piston and hydraulic fluid. Again, it appears that any surprising result was attributable to the use of an annular cylinder rather than a series of separate cylinders, a solution that had already been adopted by Metso in the HP100 and by CFBK in the Durand design—two designs that JCI's engineers did not know about in 1998.

Fourth, JCI contends that the prior art “taught away” from the inventions of claims 9 and 10. In this regard, JCI first points to two French patents issued to Corbin—French Patent Nos. 2,569,997 and 2,630,663. JCI claims that these patents teach away from using a ring-shaped piston combined with a ring-shaped seal because such a combination is a source of continuous leaks. However, the context of the Corbin patents makes clear that they are teaching away from using a specific kind of piston-and-seal combination—one that does not use a bladder. The Corbin patents employ the same bladder technology that

appears in the Durand patent discussed above, and the portion of the Corbin patents cited by JCI recommend using that technology rather than bladder-less technology because bladder-less technology is prone to leaking. Thus, Corbin does not teach away from using a bladder along with a separate piston; it teaches away from using any system that does not involve a bladder at all. So, had JCI claimed an improved form of bladder-less technology, one could say that the Corbin patents teach away from the claimed inventions. But JCI drafted its claims to cover lock rings that employ bladder technology, and therefore the Corbin patents do not teach away from what JCI claimed.

JCI also contends that the Meder patent discussed above teaches away from its inventions. Recall that the Meder patent uses a bladder-less, annular hydraulic locking system to “pre-tension” certain components on a rock crusher for the purpose of making it easier to tighten other components by hand or with a normal wrench. JCI contends that because the Meder hydraulic system is not used to provide a locking force while the crusher is in operation, Meder teaches away from using a hydraulic system to provide a locking force for the crusher during operation. However, that is not what Meder teaches. Meder says nothing one way or the other about whether hydraulic systems could be used to provide a locking force while the crusher is in operation. In any event, even assuming that Meder in the 1960s taught away from using hydraulic systems to hold the bowl in place on rock crushers, by the mid-1990s, using hydraulic systems for that purpose was common in the art, as evidenced by the HP100, the Durand patent, the Corbin patents, and also all rock crushers using a series of separate hydraulic clamping cylinders.

Fifth, JCI contends that its invention has received “industry praise.” See Geo. M. Martin, 618 F.3d at 1305. This industry praise consists of a Metso internal marketing



memorandum describing the allegedly infringing bladder-and-piston design of the post-2000 HP100 as “proven” and “safer.” However, assuming that an internal Metso document constitutes industry praise, there is no indication that this praise refers to the difference between claims 9 and 10 and the prior art—i.e., the separation of the seal portion and piston into two components. Thus, this supposed industry praise does not suggest that separating those two components was not obvious.

Finally, JCI contends that the secondary consideration of “commercial success” indicates that its invention was not obvious. See Graham, 383 U.S. at 17. As evidence of the commercial success of its invention, JCI points out that both its Kodiak crushers and Metso’s accused crushers are commercially successful. However, there is no evidence that this commercial success is attributable to the only difference between claims 9 and 10 and the prior art—i.e., the separation of the seal portion and piston into separate components. Thus, the commercial-success factor does not suggest that claims 9 and 10 were not obvious.

#### **IV. CONCLUSION**

Claims 8, 9 and 10 of the ’886 patent are invalid. Claim 8 is invalid for anticipation, and claims 9 and 10 are invalid for obviousness. Having found the relevant claims invalid, I need not address the other issues raised by the parties in their motions for summary judgment. Accordingly:

**IT IS ORDERED** that Metso’s motion for summary judgment (ECF No. 79) is **GRANTED**. The court will enter a declaratory judgment stating that claims 8, 9 and 10 of the ’886 patent are invalid.

**IT IS FURTHER ORDERED** that JCI's motion for summary judgment (ECF No. 100) is **DENIED**.

**IT IS FURTHER ORDERED** that Metso's motions to exclude the opinions and testimony of Larry W. Evans and John C. Vendelin (ECF Nos. 69 & 148) are **DENIED** as **MOOT**.

**IT IS FURTHER ORDERED** that JCI's motion to replace an incorrectly redacted brief (ECF No. 111) is **GRANTED**.

Dated at Milwaukee, Wisconsin, this 4th day of December, 2012.

s/ Lynn Adelman

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LYNN ADELMAN  
District Judge